application. However, it is noted that Claims 4-7 and 16-18 depend from generic Claim 1 which is believed to be allowable, and so it is respectfully requested that these Claims be included in any patent issuing from the present application.

Applicants thank the Examiner for the courtesy of an interview extended to Applicants' representative on August 26, 2002. During the interview, the differences between the present invention and the applied art were discussed. No agreement was reached pending the Examiner's further review when a response is filed.

In the outstanding Office Action, Claims 1-3, 8-9 and 19-20 were rejected under 35 U.S.C. § 102(a) as anticipated by Takahiro. This rejection is respectfully traversed.

Claim 1 is directed to a wiring board including a base board, a first hole, formed through the base board, including an insulating portion filled with an insulator, and a pair of second holes formed within the first hole through the insulating portion.

The present invention is directed to a through-hole for a multilayer structure (including a strip structure), for example a microstrip line (including a GND in an inner layer). The multi-layer structure of the present invention differs from a sectional structure illustrated in Figures 2-4 of Takahiro. Takahiro is limited to a double-sided printed board, and particularly to a coplanar line (signal line GND which are in a same layer). For example, Takahiro discloses, in Figure 1, a surface layer which does not include a GND. Rather, Takahiro discloses a part connected by a GND in an inner layer is in a coaxial structure. Comparatively, the present invention can be applied to a wiring board in a multi-layer structure which is illustrated in a non-limiting example in Figure 1.

One advantage of the present invention is that a diameter of the through-hole can be selected from a wide range, and therefore the impedance is controlled from a wide range. However, Takahiro discloses a through-hole for a GND which is connected to a GND pattern, and is necessarily connected to a signal pattern in the same layer. Since the signal and the

GND must be electrically isolated from each other, a first space is necessary between a through-hole for the signal and the through-hole for the GND. Therefore, in Takahiro a second space between the signal and the GND in a coaxial structure part is included with a land part and the first space, and the second space is not the same as or less than the land part. In the present invention, however, the GND pattern and the through-hole for the GND are connected in a layer different from the signal pattern; thus, the first space does not exist. Further, in the present invention a space 16 between the signal and the GND in the coaxial structure can become close to the through-hole for the signal as much as possible, and thus the impedance can be controlled in a wider range.

Additionally, the present invention minimizes the discontinuous points of impedance, and thus improves the transmission quality. However, Takahiro causes an impedance drop due to connection with the through-hole for the GND and a discontinuous part is generated in a wiring part. Further, in the present invention there is no discontinuous point of the GND, thus the transmission is of high quality. Takahiro discloses a GND part in a structure of dividing a coaxial part in half. In Takahiro, an electric current flowing in the GND must flow via a remaining half, and since GND electric current must flow indirectly, quality of a transmission signal drops. However, in the present invention, the GND is continuing constantly, and the electric current flows in a minimized path.

A further feature of the present invention is that tolerance to noise is improved. In a case of the multi-layer structure, for example the microstrip, the GND is placed counter to a width direction of a pattern. Therefore, the electromagnetic connection between the signal and the GND is stronger in the present invention as compared with the coplanar structure of connecting to the GND in a thickness direction of the pattern of Takahiro, and thus tolerance to noise is also higher in the present invention. Accordingly, the present invention includes a through-hole for utilizing these improved features. Thus, even if plating is removed from a

first through-hole for improving tolerance to noise, the tolerance to noise can be improved sufficiently only by connection between differentials. Therefore, the present invention is not disclosed by Takahiro.

Therefore, it is respectfully submitted independent Claim 1 and each of the claims depending therefrom are allowable.

In the outstanding Office Action, Claims 4, 14 and 15 were rejected under 35 U.S.C. § 103(a) as unpatentable over Takahiro. This rejection is respectfully traversed.

Claims 4, 14 and 15 depend either directly or indirectly from Claim 1, which as discussed is allowable. Further, regarding Claim 4 which recites a shortest length of the insulator filled between the pair of the second holes is shorter than a shortest length of the insulator filled between the first hole and one of the second holes, which has been found to increase the tolerance of the wiring board to external noise (page 8, lines 18-21).

Applicants respectfully note that Takahiro does not teach or suggest controlling impedance to increase the tolerance of the wiring board to external noise by modifying distances between first and secondary holes in a base board. Indeed, the Examiner has acknowledged that Takahiro lacks this teaching. However, the Examiner has alleged that Takahiro does suggest that control of impedance is known and, therefore, the modification of the distances between holes is obvious as the discovery of an optimum value of a result effective parameter.

However, as explained in the interview, Takahiro does not teach or suggest that the relationship of a shortest length of the insulator filled between the pair of the second holes and a shortest length of the insulator filled between the first hole and one of the second holes is a result effective parameter which is to be optimized. Therefore, the invention does not merely represent the discovery of an optimum value of a result effective parameter, but instead represents the discovery that the relationship of a shortest length of the insulator filled

between the pair of the second holes and a shortest length of the insulator filled between the first hole and one of the second holes is a result effective parameter for increasing the tolerance of the wiring board to external noise. This is a patentable difference. MPEP 2141.02; In re Antony, 559 F.2d 618,620, 195 USPQ 6, 8 (CCPA 1977). Thus, Claim 1 and its dependent claims are believed to define over the prior art.

Accordingly, it is respectfully submitted this rejection also be withdrawn.

Consequently in view of the present amendment and in light of the above discussion it is respectfully noted that the pending claims are allowable, and an early and favorable action to that effect is respectfully requested.

Respectfully requested,

OBLON, SPIVAK, McCLELLAND,
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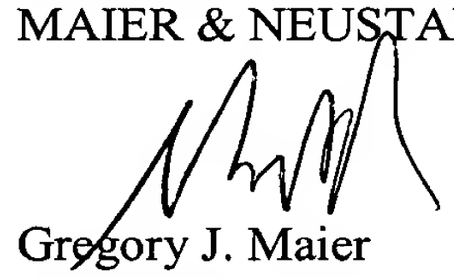

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